

## ABSTRACT

A process for producing crystalline III-V compound films, preferably thin films of gallium nitride and other III-V nitrides, on various single crystal substrates. The process enables the preparation of III-V compound films by the simple, direct deposition of an amorphous layer of a III-V compound precursor on a single crystal substrate (as a template). A chemical reaction followed by a single heat treatment leads to the crystallization and formation of films by pyrolysis. According to specific examples of the invention, the chemical precursors gallium dimethyl amide ( $\text{Ga}_2[\text{N}(\text{CH}_3)_2]_6$ ), gallium nitrate ( $\text{Ga}(\text{NO}_3)_3$ ), and gallium isopropoxide [ $\text{Ga}(\text{OC}_3\text{H}_7)_3$ ] are used to produce gallium nitride thin films.